II. Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Canceled)

2. (Currently Amended) The method of claim 12 ~~claim 1~~, further comprising the step of filtering noise from said first backscattered ultrasound data.

3. (Currently Amended) The method of claim 12 ~~claim 1~~, wherein said algorithm is an iterative algorithm that is time-invariant over small intervals.

4. (Currently amended) The method of claim 12 ~~claim 1~~, wherein said step of using at least a portion of said first backscatter ultrasound data and said algorithm to estimate the first transfer function of said catheter comprises the step of using an error-criteria algorithm and a least-squares-fit algorithm to estimate ultrasound response data for said vascular tissue and said first transfer function of said catheter, respectively.

5. (Previously Presented) The method of claim 4, further comprising the step of using said estimated ultrasound response data and said calculated first ultrasound response data to calculate final ultrasound response data for said vascular tissue.

6. (Currently Amended) The method of claim 12 ~~claim 1~~, further comprising the step of using at least said first ultrasound response data to produce an ultrasound image of vascular tissue.

7. (Currently Amended) The method of claim 12 ~~claim 1~~, further comprising the steps of:

identifying a plurality of parameters of said first ultrasound response data; and

using said plurality of parameters and previously stored histology data to characterize at least a portion of said vascular tissue.

8. (Previously Presented) The method of claim 7, further comprising the steps of:

transforming said first ultrasound response data from a time domain into a frequency domain; and

identifying at least two of said plurality of parameters from the frequency spectrum of said first ultrasound response data.

9. (Currently Amended) The method of claim 8, wherein said step of identifying said at least two of said plurality of parameters further comprises selecting said at least two parameters ~~being selected~~ from the group consisting of: maximum power, minimum power, frequency at maximum power, frequency at minimum power, y intercept, slope, mid-band fit, and integrated backscatter.

10. (Previously Presented) The method of claim 7, wherein said step of using said plurality of parameters and previously stored histology data to characterize at least a portion of said vascular tissue further comprises using said plurality of parameters and said previously stored histology data to identify a tissue type of at least a portion of said vascular tissue, said tissue type being selected from the group consisting of: fibrous tissues, fibrolipidic tissues, calcified necrotic tissues, and calcific tissues.

11. (Original) The method of claim 10, further comprising the step of using at least said identified tissue type to produce a tissue-characterization image of at least said portion of said vascular tissue on a display.

12. (Currently Amended) ~~The method of claim 1, further comprising the steps of:~~ A method of acquiring ultrasound response data for vascular tissue, comprising:

maneuvering at least a portion of a catheter through a vascular structure to a first location for acquiring ultrasound echoes from a first portion of vascular tissue;

transmitting an ultrasound signal toward the first portion of vascular tissue and acquiring first backscattered ultrasound data therefrom;

using at least a portion of said first backscattered ultrasound data and an algorithm incorporating an estimate of a tissue component of backscattered ultrasound data to estimate a first transfer function of said catheter;

calculating first ultrasound response data using at least said first transfer function, said first ultrasound response data being (i) indicative of data that is backscattered from vascular tissue and (ii) substantially independent from ultrasound data modifications resulting from said catheter;

repositioning the at least a portion of the catheter through the vascular structure to a second location for acquiring ultrasound echoes from a second portion of vascular tissue;

transmitting an ultrasound signal toward the second portion of vascular tissue and acquiring second backscattered ultrasound data therefrom;

using at least a portion of said second backscattered ultrasound data and an algorithm incorporating an estimate of a tissue component of backscattered ultrasound data to estimate a second transfer function of said catheter; and

calculating second ultrasound response data using at least said second transfer function, said second ultrasound response data being (i) indicative of data that is backscattered from vascular tissue and (ii) substantially independent from ultrasound data modifications resulting from said catheter.

13-34. (Canceled)